CLAIMS

1. Method for automatic application and monitoring of a structure, preferably an adhesive line or adhesive trail, to be applied onto a substrate characterized in that

a reference contour is determined by at least a first camera in leading direction, whereby in particular an edge of a component is preferably determined between two elements that are to be connected, in order to regulate the progression of the structure to be applied according to the reference contour, whereby the images recorded by the first camera are used to guide an application facility for the structure to be applied,

the structure to be applied is applied onto the substrate by the application facility according to the reference contour determined by the first camera,

and the structure applied onto the substrate by the application facility is monitored by at least a second camera in trailing direction.

2. Method according to claim 1, characterized in that the reference contour is determined by at least two cameras in order to carry out a three-dimensional positional correction for the application facility by means of the stereometry procedure.

3. Method according to claim 2, characterized in that the two cameras record the substrate, a section of the component or one or more components in the form of a full image or large image, whereby the full images or large images of the two cameras comprise an overlapping area in leading direction, and whereby the three-dimensional recognition of reference contour position resulting in the overlapping area is used for adjustment of the application facility prior to applying the structure.

4. Method according to at any one of the claims 1 to 3, characterized in that a projection is made onto the area of the reference contour for three-dimensional analysis, in particular one or more laser lines is/are applied onto the substrate in the form of a projection.

5. Method according to claim 1, characterized in that the reference contour is determined just by a first camera in leading direction to regulate the progression of the structure to be applied according to the reference contour, and whereby the first camera records just a strip of the image for online regulation of the application of the adhesive structure.

6. Method according to claim 5, characterized in that the second camera uses just a strip of the image for online monitoring of the applied structure.

7. Method according to claims 5 and 6, characterized in that the strips of the images of the two cameras are recorded to form a single sequence of images and whereby the image recording rate is increased in line with the data reduction achieved by recording just a strip of the image.

8. Method according to at least one of the claims 5 to 7, characterized in that each camera uses only a part, in particular approx. a third, fourth or fifth, of the picture lines as strip of the image and in that the image recording rate is multiplied accordingly, in particular essentially three-fold, four-fold or five-fold.

9. Method according to any one of the preceding claims, characterized in that a parameterization and a recording of the application track proceed in a single image recording run, whereby the images of all cameras are stored in a sequence of image.

10. Method according to claim 9, characterized in that the stored sequence of images uses the robot travel path and/or the robot travel time or the robot coordinates, the position, the contrast, the gray scale value or color value, the width and the quality of the applied structure for parameterization.

11. Method according to claim 9 or 10, characterized in that the structure to be applied is stored by means of the parameterization essentially in the form of a vector chain, whereby a high image recording rate and short partial sections of essentially between 0.5 mm and 4 mm, in particular between 1 and 3 mm, are used.

12. Method according to any one of the preceding claims, characterized in that three cameras are used, whereby each camera can be used both for regulation in leading direction according to the reference contour and for monitoring of the applied structure in trailing direction, whereby the three cameras each comprise an overlapping area to the adjacent camera on a circular line.

13. Method according to claim 12, characterized in that the angle values of the circular line from 0 to 360° form a global coordinate system, whereby a segment of the circular line is assigned to the images of the individual cameras.

14. Method according to claim 12 or 13, characterized in that an automatic switch is made, when the reference contour or the adhesive trail progresses from one camera to the next camera, when the application structure or the reference contour

progresses from the segment of the circular line of one camera via the overlapping area to the segment of the circular line of another camera.

15. Apparatus for automatic application and monitoring of a structure to be applied onto a substrate, preferably an adhesive line or adhesive trail, for carrying out the method according to claims 1 to 14, whereby at least one illumination module and on sensor unit are provided, characterized in that the sensor unit is made up of at least two cameras, whereby the cameras are provided around an application facility for the structure to be applied and are arranged on this facility such that at least one camera is provided in leading direction for regulation of the application facility by means of a reference contour and at least one camera is provided in trailing direction for simultaneous online monitoring of the structure applied onto the substrate.

16. Apparatus according to claim 15, characterized in that the optical axes of the individual cameras essentially intersect, in the direction of view, the axial longitudinal axis of the application facility or the optical axes of the individual cameras are directed to be parallel to each other, and in particular are directed to be perpendicular to the substrate.

17. Apparatus according to claim 15 or 16, characterized in that the individual cameras, in particular three cameras, are arranged at equal distances from each other in the direction of the circumference.

18. Apparatus according to any one of the claims 15 to 17, characterized in that the individual cameras interact with each other such that the images of the cameras are stored in a sequence of images.

19. Apparatus according to claim 18, characterized in that each camera records just a strip of the image to form a part of the sequence of images.

20. Apparatus according to claim 19, characterized in that the image recording rate is increased in line with the data reduction achieved by recording just a strip of the image.

21. Apparatus according to any one of the claims 15 to 20, characterized in that a projection facility is provided on the application facility, which projection facility projects one or more features, in particular strips, onto the substrate for a three-dimensional analysis.

22. Apparatus according to claim 21, characterized in that the projection

facility emits one or more laser lines for three-dimensional profile analysis.

23. Apparatus according to claim 21 or 22, characterized in that at least two projection facilities are arranged around the application facility.

24. Apparatus according to any one of the claims 15 to 23, characterized in that the cameras are arranged around the application facility such that at least an essentially circular edge scan, in particular in the form of a circular caliper, is formed whose center is formed by the application facility, whereby, in particular, the cameras are directed at a circle around the application facility whose center essentially coincides with the center of the application facility.

25. Apparatus according to any one of the claims 15 to 24, characterized in that the individual cameras comprise an overlapping area of 30° to 90° each, in particular essentially 60°, relative to the next camera.

26. Apparatus according to any one of the preceding claims 15 to 25, characterized in that the illumination module is made up of LEDs, in particular infrared LEDs, UV LEDs or RGB LEDs.

27. Apparatus according to claim 26, characterized in that the LEDs are flashed, whereby pulses of current of essentially 1.0 to 0.01 ms are used.

28. Apparatus according to any one of the claims 15 to 27, characterized in that a calibrating device with individual form elements is used for calibrating the individual cameras for the assignment of the angle assignment, whereby said form elements comprise, in particular, an angle distance of essentially 10°.

29. Apparatus according to claim 28, characterized in that the calibrating device comprises at least three marker sites that are arranged in a circular arc of the calibrating device of essentially 0°, 120°, and 240°, in order to calibrate three cameras.

30. Apparatus according to claim 29, characterized in that the marker sites on the circular line each extend in an angle range of essentially 10° whereby the marker sites are formed, in particular, by at least two form elements.